

ABSTRACT

A process is disclosed which utilizes ink-jet printing of optical polymeric fluids to produce microlenses on a substrate having an axial gradient index of refraction. Two optical polymeric fluids are used, one having an index of refraction higher than the other. A base portion of the microlens is printed using the lower index of refraction material and a cap portion of the microlens is printed over the base portion to produce a radius formed microlens. Inter-diffusion of the base portion and top or cap portion creates a generally uniform gradient diffusion zone in the axial (vertical) direction wherein the lower boundary of the zone has the index of the base portion and the upper boundary of the zone has the index of the top portion. After a sufficient gradient diffusion zone is formed, the formed microlens is solidified by curing or other means to stop any further diffusion. The microlenses may be formed as individual lenses on a optical substrate or as an array of microlenses. The gradient index microlenses produced by the method focus at a smaller focal point than single-index lenses.